2019

PG Even Semester (CBCS) Exam., May—2019

ECONOMICS

(2nd Semester)

Course No. : ECOCC–205

(Statistics for Economics)

Full Marks : 70
Pass Marks : 28

Time : 3 hours

The figures in the margin indicate full marks for the questions

Answer **five** questions, taking **one** from each Unit

UNIT—I

1. *(a)* Derive Spearman's rank correlation coefficient formula in case of united rank. 8

(b) Given the values 0 5, d^2 56, $\frac{m^3 \quad m}{12}$ 4, calculate the value of n (where the symbols have their usual meanings). 3

(c) Discuss the concept of Kendall's rank correlation coefficient. 3

2. *(a)* State whether the following statements are true or false with proper justification : 2+2=4

(i) b_{YX} 1 32 and b_{xy} 1 02

(ii) A high and positive value of r between economic growth and human development establishes that economic growth is a stimulant to human development.

(b) Given the following data, obtain the regression line of Y on X and also estimate Y at X 15. It is noted that in this example, Y stands for total amount of potato demanded (in kg) and X stands for price of potato per kg (in ₹) :

X 60 Y 40 X^2 420

Y^2 460 XY 400 n 10

Also state the interpretation of the estimated regression line of Y on X.

3+2+1=6

(c) Given the data r_{12} 0 6, r_{13} 0 4, find the value of r_{23} so that $R_{1\,23}$, the multiple correlation coefficient of X_1 on X_2 and X_3, should be unity. 4

UNIT—II

3. (a) Show that the variance of the sum of two independent random variables is equal to the sum of their individual variances. 3

(b) Define distribution function for discrete and continuous random variables. The distribution function of a continuous random variable X is given as follows :

$$F(X) \quad 1 \quad e^{\ 3x} \ \log(1 \quad x^2)$$

Determine PDF of X. 3+2=5

(c) Distinguish between binomial distribution and normal distribution. If $X \sim N(15, 20)$, then find the points of inflexion of the normal curve. 4+2=6

4. (a) Show that mean and variance for a Poisson distribution are equal. 6

(b) Define moment generating function. Show that moment generating function of two independent random variables is equal to the product of their individual moment generating functions. 3+3=6

(c) Let X is a continuous random variable in the interval (0, 1) and its PDF is defined as

$$f(X) \quad e^{\ \frac{1}{2}x} \ ; \ 0 \quad x \quad 1$$
$$0 \quad ; \ \text{otherwise}$$

Find the moment generating function of X. 2

UNIT—III

5. (a) Explain different types of random sampling with their relative merits and demerits. 7

(b) Discuss the concept of statistics and its sampling distribution. 3

(c) State whether the following statements are true or false with proper justification : 2+2=4

(i) Population mean does have a sampling distribution.

(ii) In case of purposive sampling, each and every unit of a population has an equal chance of being included in the sample.

6. *(a)* Define standard error. Derive the standard error of sample mean in case of *(i)* SRSWR and *(ii)* SRSWOR. 2+(3+3)=8

(b) Show that population mean square is an unbiased estimator of population variance. 6

UNIT—IV

7. *(a)* Distinguish between one-tailed-test and two-tailed-test. Add a note on the applications of *t* test. Point out the basic difference between Student's *t* test and paired *t* test. 4+4+2=10

(b) A random sample of 27 pairs of observations from a normal population gave a correlation coefficient of 0·6. Test whether the variables are significantly correlated in the population. Use 5% level of significance. 4

8. *(a)* Write short notes on any *two* of the following : 4×2=8

(i) Economic significance vs. Statistical significance

(ii) Applications of ^{2} test

(iii) *F* test for testing the significance of homogeneity of population variances

(b) The average hourly wage of a sample of 150 workers in plant *A* was ₹ 2·87 with a standard deviation of ₹ 1·08. The average wage of a sample of 200 workers in another plant *B* was ₹ 2·56 with a standard deviation of ₹ 1·28. On the basis of this, can an information applicant safely assume that the hourly wages paid by plant *A* are significantly higher than those paid by plant *B*? Test at 5% level of significance. 6

UNIT—V

9. *(a)* Discuss the procedure of hypothesis testing under Spearman's rank correlation test. 8

(b) Explain chi-square test of goodness of fit. Why is it called a non-parametric test? 3+1=4

(c) State are two areas of application of chi-square test of goodness of fit in empirical research. 2

10. *(a)* Define analysis of variance (ANOVA). State the important assumptions underlying ANOVA. State the applications of ANOVA in economics.

2+3+3=8

(b) Define non-parametric tests. Outline the important advantages of non-parametric tests over parametric tests.

2+4=6

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